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EXAMINER

CANTELMO, GREGG

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 08/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/721,578

Applicant(s)

SKOTHEIM ET AL.

Examiner

Gregg Cantelmo

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other:

DETAILED ACTION

Priority

1. This application claims benefit of U.S provisional Application No. 60/167,171 filed November 23, 1999.

Information Disclosure Statement

2. The information disclosure statement filed August 6, 2001 has been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

3. The drawings received November 21, 2000 are acceptable for examination purposes.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Multilayer structure in contact with a lithium Anode for electrochemical cells.

Art Unit: 1745

5. The disclosure is objected to because of the following informalities: the status of USPAT APP 08/995,122 (line 31 of page 25) should be updated as should the applications listed on page 30, lines 11-12. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "temporary" in claim 11 is unclear. The specification does not clearly disclose how the metals are held as "temporary." Since the temporary nature of the metal material is unclear, the examiner has not given patentable weight to this term. However it is noted that a prior art reference teaching of the same materials is expected to have the same properties as those disclosed as being "temporary" protective metals and thus also be a "temporary" protective metal. In the instant case, some of the metal materials in the genus of JP '357 are the same as those exemplified in the instant application as temporary protective metal layers, the properties of the prior art metal layer will be the same as those of the temporary protective metal materials of the instant application.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,314,765 (Bates '765).

Bates '765 discloses an anode of an electrochemical cell comprising a first anode active layer 22 comprising lithium (Fig. 1 and col. 2, ll. 8), a protective film 28 overlying and coating a surface of the anode 22 (Fig. 1 and col. 2, ll. 12-14 as applied to claim 14).

The instant claims do not preclude a multilayer structure in contact with the anode comprising 3 or more layers all of which are the same material. Thus claim 1 includes a multilayer structure of 3 or more layers all of which can be the same material for each of the 3 or more layers. For example, all of the layers of the multilayer structure can be the same polymer layer.

The film can be sputtered onto the anode (col. 2, ll. 39-41) to a thickness of 0.1 to 0.5 microns (col. 2, ll. 47-49).

The sputtering process is one wherein material from a target is physically removed from the target and deposited onto a substrate. The process uses a plasma of charged particles, typically argon which are attracted to the target, impact the target and sputter target atoms off of the surface of the target. The material then deposits onto the

Art Unit: 1745

substrate. The process forms a plurality of atomic layers on the substrate until the desired thickness of 0.1 to 0.5 microns (100-500 Angstroms) is achieved. Thus on the atomic level, there are at least 4 or more atom layers of the sputter-deposited protective layer formed on the substrate (as applied to claims 14 and 15).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 3-5 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of U.S. patent No. 5,441,831 (Okamoto).

Bates '765 discloses an electrochemical cell comprising: a cathode 24, anode 22, non-aqueous electrolyte interposed between the cathode and anode (abstract, Fig. 1 and col. 2, ll. 30-33 as applied to claim 1).

The instant claims do not preclude a multilayer structure in contact with the anode comprising 3 or more layers all of which are the same material. Thus claim 1 includes a multilayer structure of 3 or more layers all of which can be the same material for each of the 3 or more layers. For example, all of the layers of the multilayer structure can be the same polymer layer.

The film can be sputtered onto the anode (col. 2, ll. 39-41) to a thickness of 0.1 to 0.5 microns (col. 2, ll. 47-49). The sputtering process is one wherein material from a

Art Unit: 1745

target is physically removed from the target and deposited onto a substrate. The process uses a plasma of charged particles, typically argon which are attracted to the target, impact the target and sputter target atoms off of the surface of the target. The material then deposits onto the substrate. The process forms a plurality of atomic layers on the substrate until the desired thickness of 0.1 to 0.5 microns (100-500 Angstroms) is achieved. Thus on the atomic level, there are at least 4 or more atom layers of the sputter-deposited protective layer formed on the substrate (as applied to claims 1 and 3-5).

The single ion conducting material is LiPON, i.e. Lithium Phosphate sputtered in the presence of nitrogen thereby forming LiPON at a film thickness between about 0.1 and 0.5 micron (col. 3, ll. 15-22 as applied to claims 3, 4, 7 and 8).

The electrolyte can be a liquid electrolyte (col. 2, ll. 30-33 as applied to claim 10).

The difference between the instant claims and Bates '765 is that Bates '765 does not disclose that the cathode comprises an electroactive-sulfur-containing material (claim 1).

Electroactive-sulfur constituents in a cathode are known in the art as shown by Okamoto. Batteries using an organo-sulfur cathode material are particularly well suited for use in many consumer applications because of their high energy to weight ratio (col. 1, ll. 26-30). Such cathode materials have a high storage capacity, high discharge rate and a long cycle life at ambient temperatures (col. 3, ll. 46-50).

The motivation for providing the cathode with an electroactive-sulfur-containing material is that it provides a cathode having a high energy to weight ratio.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by providing the cathode with an electroactive-sulfur-containing material since it would have provided a cathode having a high energy to weight ratio, high storage capacity, high discharge rate and long life cycle at ambient temperatures.

12. Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of Okamoto as applied to claims 1, 3-5, 7-8 and 10 above, and further in view of U.S. patent No. 5, 569,520 (Bates '520).

The difference not yet discussed is of the anode active layer having a thickness of 2 to 100 microns (claim 2).

Bates '765 discloses that the anode is a relatively thick foil (col. 2, ll. 20-25).

Selection of an anode foil of a thickness from 2 to 100 microns is known in the art as taught by Bates '520 (col. 5, ll. 14-15). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

Use of lithium foil anodes in a thickness range of 2 to 100 microns has been well established in the art. One of ordinary skill in the art would have found selection of such

Art Unit: 1745

an anode thickness obvious since it would have provided an optimal electrode thickness with reduced electrical resistance.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of Okamoto as applied to claims 1, 3-5, 7-8 and 10 above, and further in view of JP 09-279357 (JP '357).

The difference not yet discussed is providing a metal alloy layer to the electrochemical cell (claim 6).

JP '357 discloses providing a metal layer on the surface of an anode in a lithium battery (abstract). One of the metal materials is tin.

The motivation for coating the anode active material with a metal or metal alloy such as tin, is that it suppresses the reaction between the active material in the electrode and the electrolyte, suppress the decomposition of the electrolyte and improve cycle characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by coating the electrode with a metal layer since it would have suppressed the reaction between the active material in the electrode and the electrolyte, suppressed the decomposition of the electrolyte and improved cycle characteristics.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of Okamoto as applied to claims 1, 3-5, 7-8 and 10 above, and further in view of U.S. patent No. 6,413,285 (Chu).

The difference not yet discussed is of the protective layer 28 being a polymer layer from the group of claim 9.

Chu teaches that either single ion conducting layers (such as LiPON) or polymer barrier layers, such as a diacrylate polymer, can be used in a lithium battery as a protective or barrier layer on the anode active layer (col. 3, ll. 12-29, col. 10, ll. 51-59, col. 13, ll. 39-2, col. 14, ll. 60-64, col. 15, ll. 3-14 and ll. 28-32).

The use of polymeric barrier layers meet the same performance requirements set for the glass barrier layers (such as LiPON) and in some cases are preferred because they tend to be more flexible and less likely to crack than the glass barrier layers (col. 15, ll. 3-14).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by providing a diacrylate polymer barrier layer since it would have provided a barrier layer which would have met the same performance requirements set for the glass barrier layers and would have been more flexible and less likely to crack than the glass barrier layers.

15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of Okamoto as applied to claims 1, 3-5, 7-8 and 10 above, and further in view of JP '357.

The difference not yet discussed is of providing an intermediate layer (either a temporary protective metal layer or plasma CO₂ treatment layer) between the anode active layer and protective layer.

Art Unit: 1745

JP '357 discloses providing a metal layer on the surface of an anode in a lithium battery (abstract).

The term "temporary" is unclear. The specification does not clearly disclose how the metals are held as "temporary." Since the temporary nature of the metal material is unclear, the examiner has not given patentable weight to this term. However it is noted that a prior art reference teaching of the same materials is expected to have the same properties as those disclosed as being "temporary" protective metals and thus also be a "temporary" protective metal. In the instant case, some of the metal materials in the genus of JP '357 are the same as those exemplified in the instant application as temporary protective metal layers, the properties of the prior art metal layer will be the same as those of the temporary protective metal materials of the instant application.

The motivation for coating the anode active material with a metal or metal alloy such as tin, is that it suppresses the reaction between the active material in the electrode and the electrolyte, suppress the decomposition of the electrolyte and improve cycle characteristics.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by coating the electrode with a metal layer since it would have suppressed the reaction between the active material in the electrode and the electrolyte, suppressed the decomposition of the electrolyte and improved cycle characteristics.

Art Unit: 1745

16. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of Okamoto as applied to claims 1, 3-5, 7-8 and 10 above, and further in view of U.S. patent No. 5,648,187 (Skotheim '187).

The difference not yet discussed is supporting the anode on a substrate (claim 12) of a particular material (claim 13).

Bates '765 is drawn to providing a protective coating to a lithium comprising anode in an electrochemical cell.

Skotheim '178 teaches that the anode materials can be supported on a substrate (Fig. 1 as applied to claim 12). Suitable substrate materials include polymer substrates (col. 1, ll. 63-65 as applied to claim 13).

The motivation for using a substrate is that it provides a support base upon which the electrochemical cell components can be formed upon. Thus the substrate enhances the mechanical strength of the electrochemical cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by using a substrate since it would have enhanced the mechanical strength of the electrochemical cell.

17. Claims 1, 3-5 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Skotheim '187).

Skotheim '187 is drawn to an electrochemical cell comprising: a cathode comprising an electroactive sulfur-containing material (col. 5, ll. 25-35); an anode (prior

Art Unit: 1745

art claim 1); a non-aqueous electrolyte (prior art claim 1) disposed between the cathode and anode (Fig. 1) wherein said anode comprises: a lithium active layer (prior art claim 1 and Fig 1); and a polymer layer disposed between the lithium anode and electrolyte. As shown in Fig. 1 the polymer layer (anode stabilizing film) is in contact with the surface of the anode (as applied to claim 1).

The thickness of the polymer layer is 0.1 to 5 microns (prior art claims 13 and 14 as applied to claims 3 and 4).

The electrolyte is a non-aqueous liquid electrolyte (col. 2, ll. 44-45 as applied to claim 10).

The anode further comprises a substrate in contact with a surface of the anode opposite to the polymer layer, i.e. anode stabilizing film (Fig. 1 as applied to claim 12).

The substrate can be a polymer (col. 1, ll. 63-65 as applied to claim 13).

The anode of the electrochemical cell comprises a first anode active layer comprising lithium (Fig. 1 and prior art claim 1) and a polymer layer in contact with the surface of the anode active layer (Fig. 1 and prior art claim 1 as applied to claim 14).

The differences between the instant claims and Skotheim '187 are that Skotheim '187 does not explicitly disclose that the polymer layer (anode stabilizing film) is a multilayer film of three or more layers (claims 1 and 14) and further of four or more layers (claims 5 and 15).

The instant claims do not preclude a multilayer structure in contact with the anode comprising 3 or more layers all of which are the same material. Thus claim 1 includes a multilayer structure of 3 or more layers all of which can be the same material for each of the 3 or more layers.

For example, all of the layers of the multilayer structure can be the same polymer layer.

With that, the thickness of the prior art polymer layer and the instant claims multilayer polymer layer has a significant overlapping range. Notably that the thickness of the layer or layers on the anode is between 0.01 microns to 10 microns (col. 4, ll. 15-16 of Skotheim '187) and 0.5 to 10 microns in instant claim 3. Further the thickness is preferred in a range from 0.1 micron to 5 micron (col. 4, ll. 15-16 of Skotheim '187) and 1 to 5 micron (instant claim 4).

Thus while the instant claims use the term "multilayer structure" the overall thickness of this layer is the same thickness as the polymer layer of Skotheim '187. Thus, there would be no significant structural difference between a single layer polymer layer and multiple polymer layers of the same polymer material, both of which have the same terminal thickness.

Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).
MPEP § 2112.01.

Art Unit: 1745

Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Since the prior art and instant claimed polymer layer disposed between the anode and electrolyte is the same material of claim 1 and has the same thickness (claims 4 and 5), the overall end-product of both the instant claims and prior art would have a final product polymer layer which is substantially identical.

Double Patenting

18. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

19. Claims 1, 2, 5-8 and 10-15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 9, 11, 37, 38, 43, 45-50 and 57 of copending Application No. 09/721,519 (USAPP '519).

Art Unit: 1745

Although the conflicting claims are not identical, they are not patentably distinct from each other.

USAPP '519 claims a cathode comprising a cathode active material which comprises an electroactive-sulfur containing material (claims 37 and 57); an anode (claim 37); a non-aqueous electrolyte interposed between said anode and cathode (claim 37); wherein said anode comprises an anode active layer, which the anode active layer comprises: a first layer comprising lithium metal (claim 37); an a multilayer structure comprising: an ion conducting layer comprising a glass selected from the group specified in claim 47 identical to the group in instant claim 7 (claims 46 and 47) a polymer layer (claims 48-50 as applied to claim 1) and a temporary protective metal (claim 37 as applied to claim 1).

The thickness of the first anode active layer is 2 to 100 microns (claim 41 as applied to claim 2).

The multilayer structure as claimed above comprises a first layer of lithium and three additional layers of a metal, ion conducting layer and polymer layer. Thus the structure comprises four or more layers (as applied to claim 5).

The temporary protective metal layer includes Zn, Mg, Sn and Al (claim 38 as applied to claim 6).

The ion conducting layer genus is identical to the instant claims (claims 46 and 47 as applied to claims 7 and 8).

The non-aqueous electrolyte is a liquid electrolyte (claim 54 as applied to claim 10).

The metal layer is a temporary protective metal which is in contact with the first layer comprising lithium and therefore is an intermediate layer between the first layer and the additional ion conducting and polymer layers (claims 37 and 46-50 as applied to claim 11).

The anode further comprises a substrate in contact with a surface of said first anode active layer on the side opposite to the additional layers (claim 43 as applied to claim 12).

The substrate is selected from the same genus in both the instant claims and claims of USAPP '519 (claim 45 as applied to instant claim 13)

USAPP '519 claims an anode of an electrochemical cell comprising a first anode active layer of lithium (claim 1) and three additional layers of a metal (claim 1), ion conducting layer (claim 9) and polymer layer (claim 11 as applied to claim 14). Thus the structure comprises three or more layers and further four or more layers (as applied to claims 14 and 15).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

20. Claims 14 and 15 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 6 of copending Application No. 09/864,890 (USAPP '890). Although the conflicting claims are not identical, they are not patentably distinct from each other.

USAPP '890 claims a method of making an anode. The method resulting in a product which obviates the instant claimed invention. More clearly:

The process of claim 1 of USAPP '890 forms an anode for an electrochemical cell comprising: a first anode active layer comprising lithium metal, a polymer layer and a single ion conducting layer. Thus generating an anode comprising three or more layers (claim 1 as applied to claim 14).

An additional metal layer is interposed in the multilayer structure thereby providing a fourth layer (claim 6 as applied to claim 15).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPAT 5,402,795 discloses providing a barrier layer in an electrochemical cell.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a

Application/Control Number: 09/721,578


Page 18

Art Unit: 1745

general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

gc

August 8, 2002


Patricia Ryan
Supervisory Patent Examiner
Technology Center 1700